REMARKS

Claims 1-5 were examined and reported in the Office Action. Claims 1-5 are rejected. Claims 2-3 and 5 are canceled. Claims 1 and 4 are amended. Claims 1 and 4 remain.

Applicant requests reconsideration of the application in view of the following remarks.

I.   35 U.S.C. § 103(a)

It is asserted in the Office Action that claims 1-5 are rejected in the Office Action under 35 U.S.C. § 103(a), as being unpatentable over Sohn et al ("Sohn") "*A Statistical Model-Based Voice Activity Detection*", IEEE Signal Processing Letters, Volume 6, No. 1, January 1999). Applicant has canceled claims 2-3 and 5. Applicant respectfully traverses the aforementioned rejection regarding claims 1 and 4 for the following reasons.

According to MPEP §2142

> [t]o establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." (In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Further, according to MPEP §2143.03, "[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. (In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." "*All words in a claim must be considered* in judging the patentability of that claim against the prior art." (In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970), emphasis added.)

Martin asserts that it is well known that the probability density (pdf) of speech samples in

the time domain is better modeled by a Laplacian or a Gamma density rather than a Gaussian density and cites a document that is dated as of 1987 (H. Brehm and W. Stammler, "Description and Generation of Spherically Invariant Speech-Model Signals," *Signal Processing, Elsvier*, vol. 12, pp. 119-141, 1987).

Sohn discloses the equation $\Lambda_k = \dfrac{p\langle X_k \mid H_1 \rangle}{p\langle X_k \mid H_0 \rangle}$.

The Office Action cites Gustavsson for using a Laplacian model for noise and that Sohn teaches a conventional detector. We note that it is asserted in the Office Action that because of the equal sign and the use of Laplacian density, that Sohn in view of Martin teaches the equation

$$\Lambda \frac{(L)}{k} = \frac{P_L \langle X_k \mid H_1 \rangle}{P_L \langle X_k \mid H_0 \rangle} = \frac{1}{1+\xi_K} \exp\left\{ 2\left(\mid X_{k(R)} \mid + \mid X_{k(I)} \mid\right)\left(\frac{\mid X_k \mid - \sqrt{\lambda_{n,k}}}{\mid X_k \mid \sqrt{\lambda_{n,k}}}\right)\right\}.$$

Since Martin is citing a publication dated in 1987, if it was well known to use Laplacian densities using Applicant's Laplacian equation it would seem that the Martin publication would include this equation and that Sohn could have also used a Laplacian probabilistic statistical model using Applicant's equation since Sohn published in 1999.

Further, even though Gustavsson discusses Laplacian noise, Gustavsson asserts that noise described by the Laplacian model is more impulsive than a Gaussian model; estimation and detection in Laplacian environments is notably more complex; and that the combined requirements for an analytically tractable model and for physical representation are often contradictory (Gustavsson, column 1, paragraph 4 to column 2). Therefore, the assertion in the Office Action on page 4, third paragraph, stating that the Laplacian model might be a better representation seems contradicted in Gustavsson.

Moreover, Martin discloses results using Laplacian noise model that are slightly better than a Gaussian model (see Martin, page I-256, column 2, Table 1), but that using a Gaussian/Gamma model shows consistent improvement in speech estimation. This teaches away from using a Laplacian noise model.

Therefore, by viewing the disclosures of Sohn, Gustavsson and Martin, can not jump to the conclusion of obviousness without using impermissible hindsight.

According to MPEP 2142,

> [t]o reach a proper determination under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention 'as a whole' would have been obvious at that time to that person. Knowledge of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the 'differences,' conduct the search and evaluate the 'subject matter as a whole' of the invention. The tendency to resort to 'hindsight' based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art.

Applicant submits that without first reviewing Applicant's disclosure, no thought, whatsoever, would have been made to Applicant's amended claim 1 limitations of:

> a likelihood ratio test (LRT) calculator for calculating a decision rule of voice activity detection (VAD) from the estimated power $\lambda_{n,k}(t)$ of noise signals from the noise power estimator and a complex Laplacian probabilistic statistical model, wherein the decision rule is a geometrical average of likelihood ratio Λ_k for the k-th frequency, the likelihood ratio Λ_k being determined by the following equation:

$$\Lambda_k = \frac{p\langle X_k \mid H_1 \rangle}{p\langle X_k \mid H_0 \rangle}$$

> where hypothesis H_0 represents the case of absence of speech; hypothesis H_1 represents the case of presence of speech; and X_k is the k-th discrete Fourier coefficient, and the likelihood ratio using the Laplacian statistic module is determined by the following equation:

$$\Lambda\frac{^{(L)}}{^{k}} = \frac{P_L \langle X_k \mid H_1 \rangle}{P_L \langle X_k \mid H_0 \rangle} = \frac{1}{1+\xi_K}\exp\left\{2\left(\mid X_{k(R)}\mid + \mid X_{k(I)}\mid\right)\left(\frac{\mid X_k \mid -\sqrt{\lambda_{n,k}}}{\mid X_k \mid \sqrt{\lambda_{n,k}}}\right)\right\}$$

where $\xi_k = \lambda_{s,k} \mid \lambda_{n,k}$; and $X_{k(R)}$ and $X_{k(I)}$ are a real part and an imaginary part of X_k, respectively,

nor Applicant's amended claim 4 limitations of:

> (c) calculating a decision rule of VAD from the estimated power $\lambda_{n,k}(t)$ of noisy signals and a complex Laplacian probabilistic statistical model, wherein the decision rule is a geometrical average of a likelihood ratio for the k-th frequency, the likelihood ratio being determined by the following equation:

$$\Lambda\frac{^{(L)}}{^{k}} = \frac{P_L \langle X_k \mid H_1 \rangle}{P_L \langle X_k \mid H_0 \rangle} = \frac{1}{1+\xi_K}\exp\left\{2\left(\mid X_{k(R)}\mid + \mid X_{k(I)}\mid\right)\left(\frac{\mid X_k \mid -\sqrt{\lambda_{n,k}}}{\mid X_k \mid \sqrt{\lambda_{n,k}}}\right)\right\}$$

> where hypothesis H_0 represents the case of absence of speech; hypothesis H_1 represents the case of presence of speech; X_k is the k-th discrete Fourier coefficient; $\xi_k = \lambda_{s,k} / \lambda_{n,k}$; and $X_{k(R)}$ and $X_{k(I)}$ are a real part and an imaginary part of X_k, respectively.

Since neither Sohn, Gustavsson, Martin, and therefore, nor the combination of the three, teach, disclose or suggest all the limitations of Applicant's amended claims 1 and 4, as listed above, Applicant's amended claims 1 and 4 are not obvious over Sohn in view of Gustavsson and Martin since a *prima facie* case of obviousness has not been met under MPEP §2142.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejections for claims 1-5 are respectfully requested.

CONCLUSION

In view of the foregoing, it is submitted that claims 1 and 4 patentably define the subject invention over the cited references of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Examiner believes a telephone conference would be useful in moving the case forward, he is encouraged to contact the undersigned at (310) 207-3800.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§1.16 or 1.17, particularly, extension of time fees.

Respectfully submitted,

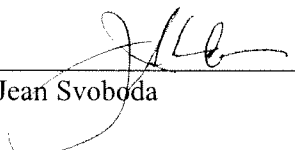BLAKELY, SOKOLOFF, TAYLOR, & ZAFMAN LLP

Dated: August 3, 2007   By: _____

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CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being submitted electronically via EFS Web on the date shown below to the United States Patent and Trademark Office.

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Jean Svoboda   Date: August 3, 2007